Variable Energy Ignition System for Heavy Fuel Rotary Engine

NOTE: The Solicitations and topics listed on this site are copies from the various SBIR agency solicitations and are not necessarily the latest and most up-to-date. For this reason, you should use the agency link listed below which will take you directly to the appropriate agency server where you can read the official version of this solicitation and download the appropriate forms and rules.

The official link for this solicitation is:
http://www.acq.osd.mil/osbp/sbir/solicitations/sbir20152/index.shtml

Agency:
Department of Defense

Release Date:
April 24, 2015
Branch:
n/a

Open Date:
April 24, 2015
Program / Phase / Year:
SBIR / Phase I / 2015

Application Due Date:
June 24, 2015

Solicitation:
DoD 2015.2 SBIR Solicitation

Close Date:
June 24, 2015
Topic Number:
A152-098

Description:
There currently is a shortcoming for heavy fuel engines that have a rated power below 100 BHP that are compatible with both JP-8 and DF-2, have high power to weight and power to volume density, provide good fuel consumption characteristics, and operate over extreme climatic ranges ranging from below -25 F to 125 F ambient. One developing technology that could potentially fit this niche market are spark ignited heavy fuel, rotary diesel engines that can provide from 10 BHP to 50 BHP per rotor, have best brake fuel consumption less than 0.5 lbm/bhp-hr, and have an engine power density of 1 hp/lbm for small ground vehicles. A major challenge with such engines is the combustion system development, of which the ignition system is a critical element. This is due to the ignition source’s direct contact with injected fuel and the complex fuel and air flow path characteristics. There are significant performance and reliability gains with a high energy ignition event at low engine speeds and startup, compared to low ignition energy at high speed conditions. The performance requirements for this ignition system SBIR are as follows: • Variable output: 50 - 200 mJ / spark • Response Time: 2000 Hz • Ambient Temperature Range: -25 F to 125 F • Size: 1.5 Liters • Weight: 4.5 lbs • Power Consumption: 120W • Output (plug) channels: 5 • Fully controllable: Energy output, timing PHASE I: Identify and assess ignition system components and design approach. Design a brass board ignition module for simulated workbench use. PHASE II: Develop and build two generations of ignition system prototypes. Demonstrate and validate the performance stated in the topic description through computational analysis, bench top experimentation, and relevant engine hardware demonstration. The system shall be controllable via a software interface. Demonstrations shall be completed in a laboratory environment with the TARDEC Combat Vehicle

Prototype (CVP) program Advanced Auxiliary Power. The Advanced Auxiliary Power Program utilizes a 700cc heavy fuel rotary engine to produce 45kW of electric power. PHASE III: Develop and build a hardened prototype ignition system module capable of meeting MIL-STD-805C environmental standards. The ignition system shall be readily integrated onto the CVP program, transition mechanism to the Future Fighting Vehicle (FFV). The resulting ignition system could be available for rotary diesel engines used in future Army unmanned ground and aerial vehicles that have power requirements ranging from 20 – 100 BHP while improving in performance and reliability from the current state of the art.